



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/540,754

12/23/2005

Christian David

2003P07571WOUS

9099

28204 7590 09/04/2008

SIEMENS SCHWEIZ AG  
I-47, INTELLECTUAL PROPERTY  
ALBISRIEDERSTRASSE 245  
ZURICH, CH-8047  
SWITZERLAND

EXAMINER

JELSMA, JONATHAN G

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

09/04/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/540,754	<b>Applicant(s)</b> DAVID ET AL.	
	<b>Examiner</b> Jonathan Jelsma	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 24 June 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-2, and 4-9 is/are rejected.
- 7) ☒ Claim(s) 3 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>06/24/2005</u> .  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Summary***

1. This is the initial office action based on application 10/540,754 filed on 12/23/2005 by Christian David and Harun Solak.
2. Claims 1-9 are currently pending and have been fully considered.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 4, 6, and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by FLANDERS (US 4,360,586).
5. FLANDERS teaches a method of producing gratings with fine spatial period using visible, UV, or X-ray radiation for example (column 1 lines 20-23). The mask is used in a system, where there is a source of energy which illuminates a surface through a mask having a spatial period, and the mask is separated from the surface to be exposed by a function of the period of the mask, so that the distance is dependent upon the specific period of the mask (column 1 lines 66-68, column 2 lines 1-3). The process of FLANDERS further includes the use of multiple masks to form the ultimate pattern (column 3 lines 46-53). Additionally the mask may be phase shifted (column 5 lines 37-42), and may have features with variable period gratings (column 5 lines 50-54). These

Art Unit: 1795

diffracted phase shifted light causes intensity patterns (see figure 6). The mask may have a pattern comprising of a concentric circular apertures (column 7 lines 18-19, column 8 line 1). Further as seen in figure 1, the line width to length ratio of the pattern is greater than 1.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over FLANDERS (US 4,360,586), in view of STARODUBOV (US 6,344,298 B1).

9. Claim 2 is dependent upon claim 1 which is rejected above under 35 U.S.C. 102(b) in view of FLANDERS. FLANDERS teaches an exposure through a mask pattern with concentric circular apertures (column 7 lines 18-19, column 8 line 1). FLANDERS further teaches the exposure through a plurality of masks (column 3 lines

Art Unit: 1795

47-53). Where each exposure compounds the mask pattern desirably (figure 7).

However, FLANDERS does not explicitly teach further exposure using a mask with a radial extending interference mask pattern to generate a circumferential partitioning of the initial circular pattern.

10. STARODUBOV teaches a circular mask which has a pattern that varies circumferentially (column 2 lines 37-40). The mask comprises first and second sets of alternating sections that differ from each other, in for example different transmission (column 2 lines 43-46).

11. At the time of the invention one having ordinary skill in the art would have been motivated to use the additional mask with a radial extending diffraction pattern as taught by STARODUBOV in the method of exposure of FLANDERS, thereby generating a circumferential partitioning of the of the concentric circular pattern of FLANDERS with the radial extending diffraction pattern of STARODUBOV, this is the application of prior art elements in order to obtain the predictable results of the interference of the mask patterns with the plurality of exposures (see FLANDERS figure 7).

12. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over FLANDERS (US 4,360,586), in view of SHIRAISHI (US 5,467,166).

13. Claim 5 is dependent upon claim 1 which is rejected above under 35 U.S.C. 102(b) in view of FLANDERS. FLANDERS teaches that the mask is irradiated through a source of radiant energy (column 1 lines 66-68). However, FLANDERS does not

Art Unit: 1795

explicitly teach that the light source generates light having a circular or linear polarization which varies with time.

14. SHIRAISHI teaches using a light source which creates light in a random polarized state, which varies with time (column 12 lines 40-44). The light then passes through a circular transmitting polarizing plate, allowing only linearly polarized light to transmit (column 12 lines 51-61). This method creates two beams which do not interfere with each other, and then when they arrive on the wafer the respective beams are independently amplitude combined the images (column 13 lines 1-8).

15. At the time of the invention one having ordinary skill in the art would have been motivated to use the light polarizing apparatus of SHIRAISHI, in the method of FLANDERS in order to increase the depth of focus of each image (SHIRAISHI, column 13 lines 7-9).

16. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over FLANDERS (US 4,360,586), in view of STARIKOV (US 6,309,809 B1).

17. Claim 7 is dependent upon claim 6 which is rejected above under 35 U.S.C. 102(b) in view of FLANDERS. However, FLANDERS does not teach the method of using immersion lithography to decrease feature size.

18. STARIKOV teaches a patterning method using immersion lithography (column 12 lines 34-38). STARIKOV teaches that the use of immersion lithography with an immersion fluid with a refractive index of 1.4 would produce smaller features sizes, than by a method of dry lithography (column 12 lines 39-45).

Art Unit: 1795

19. At the time of the invention one having ordinary skill in the art would have been motivated to use the immersion lithography method of STARIKOV in the exposure method of FLANDERS for the added improvement of achieving smaller periods and feature size (see STARIKOV column 12 lines 43-45).

20. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over FLANDERS (US 4,360,586), in view of HWANG (US 2004/0157086 A1).

21. Claim 9 is dependent upon claim 1 which is rejected above under 35 U.S.C. 102(b) in view of FLANDERS. FLANDERS teaches a method of exposing a surface in order to create the desired pattern (column 1 lines 66-68, column 2 lines 1-7).

However, FLANDERS does not explicitly teach where that surface support material comprises a layer for magnetic bit cells for a magnetic storage device.

22. HWANG however teaches the formation of a magnetic bit cells for a magnetic storage device (paragraph 0034). HWANG uses a photolithographic process to pattern the magnetic storage device (paragraph 0038-0039).

23. At the time of the invention one having ordinary skill in the art would have been motivated to include a layer for magnetic bit cells for a magnetic storage device as taught by HWANG in the process of FLANDERS, since HWANG teaches an example of a desirable surface to be patterned and imaged.

***Allowable Subject Matter***

24. Claim 3 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

25. The prior art of record does not teach or suggest using an exposure with a first mask having a combined circular and spiral interference mask pattern, and a second step of exposure through a second mask with a combined circular and spiral exposure pattern with the spiral pattern of the second mask being oriented opposite that of the first mask.

***Conclusion***

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Jelsma whose telephone number is (571)270-5127. The examiner can normally be reached on Monday to Thursday 7:00 a.m. - 5:00 p.m.

27. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on (571)272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Art Unit: 1795

28. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mark F. Huff/

Supervisory Patent Examiner, Art Unit 1795

JGJ